

ART. I.—*Australian Rhinotermes (Isoptera)*.

By GERALD F. HILL,

(Division of Economic Entomology, C.S.I.R., Canberra.)

(With Plates I-IV.)

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The genus *Rhinotermes* Hagen is characterised by Holmgren (1) as follows:—

Imago.—Head almost circular; clypeus more or less strongly inflated, with median furrow; fontanelle open, rather broad, placed towards the front; antennae of 20-22 segments, third segment longer than second.

Soldier.—Of two distinct forms, either large or small, with bifid labrum. Mandibles of the large soldier stout and very strong, left mandible with two and the right with one strong tooth, basal part not finely toothed. In the smaller soldier the mandibles are relatively longer, narrower and straighter and the teeth narrower and more pointed, or the mandibles are rudimentary. The labrum in the larger soldier is relatively short and broad, in the small one it projects beyond the mandibles. At the anterior end it is bifid, grooved and relatively broad or very narrow. Antennae of 14-17 segments. Pronotum rather small, much narrower than the head. Styli present.

Worker.—Antennae of 16-18 segments, 3rd segment longer than 2nd. Pronotum saddle-shaped.

Silvestri (2) established the genus *Schedorhinotermes*, with *R. intermedius* Brauer as type, for the reception of species with imagos having a non-protuberant clypeus and minor soldiers with very long labrum and short mandibles.

Holmgren did not regard the characters noted by Silvestri as of sufficient importance to warrant generic recognition, and divided the genus, as defined above, into two subgenera, as follows:—

Subgenus **Schedorhinotermes** (Silvestri).

Imago.—Clypeus slightly drawn out towards the front, or merely markedly rounded.

Large Soldier.—Compare with the generic description.

Small Soldier.—Labrum relatively broad, as long as mandibles or somewhat shorter, seldom longer; mandibles toothed.

Worker.—Compare with the generic description.

Subgenus **Rhinotermes** s. str. Hagen.

Imago.—Clypeus strong, beak-shaped, overhanging the base of the labrum. Head relatively large.

Large Soldier.—Compare with the generic description.

Small Soldier.—With bifid labrum; mandibles rudimentary.

Worker.—Compare with the generic description.

The species and subspecies referred to in this paper, as well as *R. umbraticus* Hill, from New Britain, may be referred to the sub-genus *Schedorhinotermes*, if it be necessary to recognise such a subdivision at all.

Difficulty arises in the satisfactory classification of Australian species of *Rhinotermes* owing to the similarity of the imagos of several forms which are associated with soldiers possessing characters at least as distinct as those usually accepted as specific in other genera.

There can be no doubt that the two first described species, *R. intermedius* Brauer, 1866, and *R. reticulatus* Froggatt, 1896, are specifically distinct. The remaining described species, *R. breintli* Hill (1921), if considered alone, might well be regarded, as Dr. Emerson regards it, as representing a third species, since in the reproductive and sterile castes it is easily separable from both of the above; but it is not easily distinguishable from other forms which in one or other of the castes closely resemble Brauer's species.

The tentative classification proposed in this paper is based largely on differences in measurements of the imagos and on morphological differences in the soldiers, and is intended particularly to facilitate the identification (as subspecies) of forms which, at present, cannot be satisfactorily grouped under any of the described species, nor regarded as valid species.

All of the known species of *Rhinotermes* are of considerable economic importance, and are surpassed only by *Mastotermes*, and possibly in some localities by *Coptotermes*, as destroyers of fence-posts and wooden buildings.

The genus is known to occur throughout Australia, excepting in Tasmania, southern and south-eastern Victoria, south-eastern New South Wales, and South Australia; but it is almost certain that it will be found in the latter State, since it is known from adjacent areas in Victoria, New South Wales, Central Australia, and West Australia.

RHINOTERMES INTERMEDIUS INTERMEDIUS Brauer.

Reise der Novara, Zool. Theil. 2a. 1866.

(Pl. I, figs. 1 and 2.)

Imago.

Colour.—Yellow ochre above; antennae, palpi, postclypeus and under surface somewhat paler; radius and radial sector yellowish-brown, wing membrane hyaline.

Head.—Viewed from above rounded, semi-circular behind the eyes, frons depressed and furrowed. Eyes large and prominent.

Ocelli large, broadly oval. Postclypeus short, strongly convex, truncate in front; anteclypeus short, hardly projecting beyond the postclypeus. Labrum short and wide, widest at the base, narrowed to the rounded apex. Antennae with 20 segments; 1st segment cylindrical, a little less than twice as long as 2nd; 2nd cylindrical, much narrower than 1st, as long as 4th; 3rd about two-thirds as long as 1st and as wide at the apex; 4th globose, a little narrower than 3rd; 5th-19th increasing slightly in length progressively; 20th a little shorter and much narrower than 19th.

Thorax.—Pronotum large, slightly narrower than head, anterior and posterior margins slightly sinuate, anterolateral angles broadly rounded, sides slightly narrowed to the wide posterior margin. Posterior margin of meso- and metanotum broadly concave.

Wings.—Forewing rather more than three times longer than wide; radius and radial sector distinct, the other veins and membrane hyaline; the median branches from the radial sector near the base of the stump, passes through the middle of wing at the suture and runs parallel with and near to the radial sector for a short distance before curving posteriorly; at the middle of the wing it passes through the anterior one-third, where the first of several branches occur, the anteriormost of which joins the margin below the apex. The cubitus runs above the middle of the wing before curving downwards to the posterior margin, with which it junctions at the distal fourth of the wing. This vein has many long branches to the posterior margin. In the hindwing the median branches from the radial sector a little beyond the suture, and usually has many branches from its proximal half. The cubitus is generally similar to that of the forewing. Stumps of forewings overlapping the basal half of those of the hindwings.

Legs.—Long and slender; tibiae and tarsi very hairy; tibial spurs 2 : 2 : 2.

Measurements.

	mm.
Length with wings - - - -	17.00—18.00
Length without wings - - - -	8.00— 8.50
Head, base to apex of labrum, long - -	1.75— 1.85
Head, base to elypeofrontal suture, long -	1.34
Head, at and including eyes, wide - -	1.75
Gula, at the middle, wide - - - -	0.50
Fontanelle, from clypeofrontal suture -	0.29
Pronotum, long, 0.82—0.92; wide - - -	1.53— 1.66
Forewings, long 13.5; wide - - - -	4.00
Tibia, iii, long - - - - -	2.00
Eyes, diameter - - - - -	0.43 × 0.48—0.44 × 0.55
Eyes, from lower lateral margin of head -	0.12
Ocelli, diameter - - - - -	0.12 × 0.15—0.16
Ocelli, from eyes - - - - -	0.05
Postclypeus, long 0.26; wide - - - -	0.74

Soldier.

Large form (previously undescribed).

(Pl. I, fig. 1.)

Colour.—Head light yellow, a little darker than remainder of insect; base of mandibles yellow-brown, apical half light ferruginous.

Head.—Large, rounded behind, widest at the posterior one-third, narrowed to the base of the mandibles, with very few hairs. Mandibles large; the left with two large teeth in the apical half; the right with one large tooth about the apical one-third, no small tooth between the former and the base of the mandible. Labrum extending to the base of the basal tooth on the left mandible, markedly widened about the basal third, thence narrowed to the widely emarginate anterior margin. Gula long and narrow, the narrowest part about one-fifth the width of the head at this point. Antennae of 18 segments; 1st long and nearly cylindrical, 2nd about half as long as 1st; 3rd nearly always longer than 2nd, rarely equal or shorter; 4th smallest of all, the remaining segments moniliform, increasing in length progressively.

Thorax.—Pronotum short and wide, with scanty long and short hairs, the anterior margin convex and sloping to the rather sharply narrowed anterolateral corners, the sides narrowed sharply to the sinuate posterior margin.

Legs.—Long and slender, the femore with few, the tarsi with many hairs; tibial spurs 2 : 2 : 2.

Abdomen.—With scanty hairs.

Measurements.

	mm.
Total length - - - - -	6.50—7.00
Head, with mandibles, long - - - - -	2.77—2.96
Head, at widest part - - - - -	1.73—1.85
Head, base to fontanelle - - - - -	1.48—1.59
Mandible, left, long - - - - -	1.07—1.22
Gula, at narrowest part, wide - - - - -	0.37—0.40
Pronotum, long 0.59—0.62; wide - - - - -	1.25—1.33
Tibia iii, long - - - - -	1.59—1.73

Soldier.

Small form (previously undescribed).

(Pl. I, fig. 2.)

Generally similar to the large form except in size; the sides of the head parallel to the antennal fossae, thence narrowed sharply to the base of the mandibles. Labrum long, extending to the apex of the apical tooth in the left mandible, slightly narrowed in the middle. Antennae of 16 segments; 3rd nearly always shorter than 2nd, very rarely equal. Gula relatively wide at its narrowest part, where it is about one-third as wide as head.

Measurements.

	mm.
Total length - - - - -	4.50
Head, with mandibles, long - - - - -	1.50—1.80
Head, at widest part - - - - -	0.88—0.96
Head, base to fontanelle - - - - -	0.85—0.92
Mandible, left, long - - - - -	0.70—0.74
Gula, at narrowest part, wide - - - - -	0.27—0.29
Pronotum long 0.40—0.44; wide - - - - -	0.70—0.77
Tibia iii, long - - - - -	1.07—1.33

Localities.—New South Wales: Sydney (type locality) and district, Taree, Newcastle; Queensland: Brisbane, Mt. Tambourine, Mackay, (?) Cairns.

Biology.—*Rhinotermes* do not build mounds, although parties of soldiers and workers occur sometimes in the mounds of other genera. They are usually found in structural timber or in and under logs in the forest. In the latter situation it is not unusual to find one or more young royal pairs, with or without a few young of their own or of other species (*Coptotermes*), and colonies comprising soldiers and workers of the species under notice have been found in the heart of living eucalypts. The nest and the ovigerous queen have not been described; it is probable that they are to be found at some depth below the surface of the soil. The alate form has been taken near Sydney on 15th and 29th December.

Types.—The holotype (alate imago) is in the Vienna Museum, where it was critically examined by Dr. Alfred Emerson in 1927. Morphotypes (soldiers and worker) are in the C.S.I.R. collection, Canberra.

RHINOTERMES INTERMEDIUS SECLUSUS, n. subsp.

(Pl. II, figs. 3 and 4.)

Imago.

Similar to the typical form, but differing in having shorter wings, larger head, etc.

Measurements.

	mm.
Length with wings - - - - -	14.50—15.25
Length without wings - - - - -	8.25—9.00
Head, base to apex of labrum, long - - - - -	1.81—1.92
Head, base to clypeofrontal suture, long - - - - -	1.44
Head, at and including eyes, wide - - - - -	1.80—1.88
Gula, at middle, wide - - - - -	0.50—0.55
Fontanelle from clypeofrontal suture - - - - -	0.33—0.37
Pronotum, long 0.85—0.99; wide - - - - -	1.59—1.70
Forewings, long 10.50; wide - - - - -	3.50
Tibia iii, long - - - - -	2.14—2.33
Eyes, diameter 0.44 × 0.55; 0.44 × 0.48 - - - - -	0.48 × 0.48
Eyes, from lower lateral margin of head - - - - -	0.11—0.14
Ocelli, diameter - - - - -	0.14 × 0.21
Ocelli, from eyes - - - - -	0.07
Postclypeus, long 0.18; wide - - - - -	0.81

Soldier.

Large form.

(Pl. II, fig. 3.)

Similar to the typical form, but head larger and more rounded on the sides, mandibles sometimes more slender and always with a short blunt tooth midway between the large tooth and base of the left mandible; antennae of 17 or 18 segments, the 2nd and 3rd segments nearly always equally long, 2nd rarely longer than 3rd.

Measurements.

	mm.
Total length - - - - -	7.00—7.50
Head, with mandibles, long - - - - -	2.96—3.33
Head, at widest part - - - - -	1.85—2.22
Head, base to fontanelle - - - - -	1.55—1.73
Mandible, left, long - - - - -	1.11—1.29
Mandible, right, long - - - - -	1.11—1.29
Gula, at narrowest part, wide - - - - -	0.38—0.46
Pronotum long 0.62—0.74; wide - - - - -	1.14—1.40
Tibia iii, long - - - - -	1.48—1.85

Soldier.

Small form.

(Pl. II, fig. 4.)

Similar to the typical form, but larger. The gula is wider, the 2nd segment of the antennae, which has 16 segments, is nearly always as long as the 3rd, rarely shorter. The head is narrowed posteriorly, and is, therefore, not so broadly rounded behind.

Measurements.

	mm.
Total length - - - - -	4.50—5.00
Head, with mandibles, long - - - - -	1.73—1.92
Head, at widest part - - - - -	0.93—0.99
Head, base to fontanelle - - - - -	0.95—1.05
Mandible, left, long - - - - -	0.75—0.85
Gula, at narrowest part, wide - - - - -	0.31—0.33
Pronotum, long 0.48—0.53; wide - - - - -	0.72—0.81
Tibia iii, long - - - - -	1.07—1.25

Localities.—Queensland: Babinda, Innisfail, El Arish, Japoon, Meringa, Malanda, Dunk Island, Palm Island, Cairns, ? Mt Tambourine, ? Brisbane, ? Darra, ? Enoggera. (Dealted imagos only are available from the doubtful localities.)

Biology.—The majority of the series examined are from rotten logs in rain-forests. It has been taken on the ground under imported softwood and from living sugar-cane sets. The nest and ovigerous queen are undescribed. The alate form has been taken at Babinda on 6th January, and on Palm Island on 4th January.

Types.—In the National Museum, Melbourne.

RHINOTERMES INTERMEDIUS ACTUOSUS, n. subsp.

(Pl. II, fig 5, and Pl. III, fig. 6.)

Imago.

Similar to *R. intermedius intermedius* and *R. intermedius seclusus* but smaller; the radius and radial sector paler, wing membrane faintly tinged with yellow, the eyes distinctly smaller.

Measurements.

	mm.
Length with wings - - - - -	13.50—14.00
Length without wings - - - - -	7.00—8.00
Head, base to apex of labrum, long - - -	1.66—1.77
Head, base to clypeofrontal suture, long - -	1.14—1.35
Head, at and including eyes, wide - - -	1.62—1.66
Gula, at middle, wide - - - - -	0.47
Fontanelle from clypeofrontal suture - - -	0.33—0.37
Pronotum, long 0.80—0.85; wide - - -	1.36—1.44
Forewings, long 10.00—10.25; wide - - -	3.00
Tibia iii, long - - - - -	1.77—1.88
Eyes, diameter 0.37 × 0.44; 0.37 × 0.48 - -	0.40 × 0.48
Eyes from lower lateral margin of head - -	0.14
Ocelli, diameter - - - - -	0.14 × 0.16—0.16 × 0.18
Ocelli, from eyes - - - - -	0.05—0.06
Postclypeus, long 0.22; wide - - - - -	0.74—0.81

Soldier.

Large form.

(Pl. II, fig. 5.)

Head more or less quadrate, i.e., not markedly rounded behind and on the sides, and differing otherwise from the preceding forms in its relatively narrower gula and differently shaped mandibles. There is a short basal tooth on the right mandible, as in *R. intermedius seclusus*. The antennae have 18 segments, the 2nd being as long as, or a little shorter than, the 3rd.

Measurements.

	mm.
Total length - - - - -	6.50—7.00
Head, with mandibles, long - - - - -	2.80—3.25
Head, at widest part - - - - -	1.80—2.10
Head, base to fontanelle - - - - -	1.77—1.96
Mandible, left, long - - - - -	1.11—1.22
Gula, at narrowest part, wide - - - - -	0.25
Pronotum, long 0.60—0.74; wide - - - - -	1.30—1.48
Tibia iii, long - - - - -	1.50—1.66

Soldier.

Small form.

(Pl. III, fig. 6.)

The head is similar in shape to that of *R. intermedius intermedius*, but the gula is distinctly narrow. The antennae have 16

segments, the 2nd of which is generally as long as the 3rd, rarely a little shorter or longer.

Measurements.

	mm.
Total length - - - - -	4.50—4.75
Head, with mandibles, long - - - - -	1.70—1.85
Head, at widest part - - - - -	0.92—1.03
Head, base to fontanelle - - - - -	0.92—1.00
Mandible, left, long - - - - -	0.74—0.77
Mandible, right, long - - - - -	0.74—0.77
Gula, at narrowest part, wide - - - - -	0.22—0.25
Pronotum, long 0.44—0.51; wide - - - - -	0.79—0.83
Tibia iii, long - - - - -	0.85—0.96

Localities.—Northern Territory: Darwin, Point Charles, Batchelor, Stapleton, Brock's Creek, and ? Bathurst Island; North-Western Australia: Wyndham.

Biology.—This is an exceedingly destructive insect, attacking living trees and seasoned timber, and often causing extensive damage to buildings, fences, etc. Access to buildings resting upon concrete or brick piers is gained by the construction of tubes or covered-ways from the ground to the bearers, which are frequently not adequately isolated by the interposition of an effective stump-cap or metal plate. There is some evidence that the nest whence these foraging parties disperse is situated fairly deeply in the soil, and that subterranean passages radiate for some distances from it to the sources of food supply. The presence of *Rhinotermes* in trees and timber is generally indicated by an extensive surface envelope of thin, earthy material, which often not only conceals the infested cracks and crevices, but covers an extensive area of bark or weathered wood, upon which the termites feed. This envelope also serves as a protection and assembling place for the winged males and females, which leave the parent colony at night from the latter part of November to the middle of March. *Rhinotermes* are strongly attracted by artificial lights indoors, a fact that has led to the detection of previously unsuspected damage. On several occasions soldiers and workers were found in abandoned, or partly abandoned, mounds of other species, sometimes alone, but more often with *Mastotermes darwiniensis* and *Mirotermes* spp. The object of these invasions was not determined, but it appeared probable that the dejecta of the original occupants was being gathered for food.

Types.—In the National Museum, Melbourne.

RHINOTERMES INTERMEDIUS DEROSUS, n. subsp.

(Pl. III, figs. 7 and 8.)

Imago.

Similar to *R. intermedius actuosus*, but differing appreciably in its reduced size.

Measurements.

	mm.
Length with wings - - - -	12.00—12.25
Length without wings - - - -	6.75
Head, base to apex of labrum, long - -	1.40
Head, base to clypeofrontal suture, long -	1.18
Head, at and including eyes, wide - -	1.49
Gula, at middle, wide - - - -	0.44
Fontanelle from clypeofrontal suture - -	0.46
Pronotum, long 0.72; wide - - - -	1.25
Forewings, long 8.50; wide - - - -	2.67
Tibia iii, long - - - -	1.59
Eyes, diameter - - - -	0.35 × 0.40
Eyes, from lower lateral margin of head -	0.11
Ocelli, diameter - - - -	0.14 × 0.16
Ocelli, from eyes - - - -	0.02
Postclypeus, long 0.18; wide - - - -	0.66

Soldier.

Large form.

(Pl. III, fig. 7.)

Most closely related to *R. intermedius actuosus*, from which it differs *inter alia* in having the head shorter and widened posteriorly, the antennal segments long, the 3rd segment markedly longer than in other subspecies, and the gula wider.

Measurements.

	mm.
Total length - - - -	7.00—7.50
Head, with mandibles, long - - - -	2.33—2.66
Head, at widest part - - - -	1.85—2.00
Head, base to fontanelle - - - -	1.66—1.77
Mandible, left, long - - - -	1.11—1.29
Gula, at narrowest part, wide - - - -	0.29—0.37
Pronotum, long 0.74—0.81; wide - - -	1.18—1.42
Tibia iii, long - - - -	1.59—1.92

Soldier.

Small form.

(Pl. III, fig. 8.)

Larger than that of *R. intermedius actuosus*, segments of the antennae longer, the 3rd segment conspicuously long, and the gula wider. A greatly reduced basal tooth is present on the right mandible.

Measurements.

	mm.
Total length - - - - -	5.40
Head, with mandibles, long - - - - -	1.99
Head, at widest part - - - - -	1.03
Head, base to fontanelle - - - - -	1.11
Mandible, left, long - - - - -	0.85
Gula, at narrowest part, wide - - - - -	0.30
Pronotum, long 0.55; wide - - - - -	0.87
Tibia iii, long - - - - -	1.36

Localities.—North-Western Australia: Derby, Upper Leve-rynga, ? Jigalong, Wallal.

Types.—In the National Museum, Melbourne.

Discussion.

Mjöberg (1920) recorded *R. reticulatus* Frogg. (imagos) and *R. intermedius* Brauer (all castes) from Kimberley, N.W.A. In an earlier paper (Hill, 1921, *infra*, p. 453) it was stated that no differences could be found between Mjöberg's specimens of the former (from Oscar Range) and *R. breinli*. Having re-examined these specimens and compared them with several series (including co-types) of *R. reticulatus*, *R. breinli* and the proposed new subspecies, I unhesitatingly refer them to the last-mentioned, which is distinguished from *R. reticulatus* by its greater length, paler and smaller wings, smaller head, larger eyes, smaller and less convex postclypeus, larger ocelli and differently shaped frons, and by differences in both the large and small forms of the soldier.

I have not seen an example of the alate form from Yeeda, N.W.A., which Mjöberg has identified as *R. intermedius* Brauer; but soldiers and workers from his collection from this locality appear indistinguishable from the subspecies under notice, from a locality about 50 miles distant, and differ considerably from Sydney and Newcastle (N.S. Wales) specimens.

It must be noted, however, that Mjöberg found imagos with those soldiers which he was able to separate specifically from his Oscar Range specimens, indicating the existence of two species of *Rhinotermes* in Kimberley.

RHINOTERMES INTERMEDIUS BREINLI Hill.

Proc. Linn. Soc. N.S.W., xlv. pt. 4, p. 449, 1921.

(Pl. IV, figs. 9 and 10.)

Imago.

Differences in measurements only appear to distinguish this subspecies from *R. intermedius actuosus* and *R. intermedius derosus*.

Measurements.

	mm.
Length with wings - - - -	11.50—12.00
Length without wings - - - -	6.25—7.75
Head, from base to apex of labrum, long -	1.45—1.55
Head, from base to clypeofrontal suture, long	1.03—1.25
Head, at and including eyes, wide - - - -	1.36—1.40
Gula, at middle, wide - - - -	0.44
Fontanelle from clypeofrontal suture - - - -	0.27
Pronotum, long 0.75 wide - - - -	1.18—1.23
Forewings, long 9.00; wide - - - -	2.85—3.00
Tibia iii, long - - - -	1.59
Eyes, diameter - - - -	0.40 × 0.44
Eyes, from lower lateral margin of head -	0.07—0.11
Ocelli, diameter - - - -	0.14—0.16 × 0.18
Ocelli, from eyes - - - -	0.01
Postclypeus, long 0.25—0.29; wide - - - -	0.62—0.66

Soldier.

Large form.

(Pl. IV, fig. 9.)

The quadrate and hairy head, narrow gula and absence of a basal tooth on the right mandible distinguish this subspecies from all others. In the description the head is said to be clothed with "scanty stout setae," whereas by comparison with others it is markedly hairy.

Measurements.

	mm.
Total length - - - -	5.50
Head, with mandibles, long - - - -	2.44
Head, at widest part - - - -	1.50—1.55
Head, base to fontanelle - - - -	1.44
Mandible, left, long - - - -	1.03—1.11
Gula, at narrowest part, wide - - - -	0.22
Pronotum, long 0.62—0.66; wide - - - -	1.14—1.22
Tibia iii, long - - - -	1.27—1.40

Soldier.

Small form.

(Pl. IV, fig. 10.)

Distinguished from other subspecies by the following characters: Head hairy, straight on the sides and narrowed to the posterior margin, labrum long and relatively narrow.

Measurements.

	mm.
Total length - - - - -	3.00
Head, with mandibles, long - - - - -	1.62
Head, at widest part - - - - -	0.81—0.85
Head, base to fontanelle - - - - -	0.79—0.85
Mandible, left, long - - - - -	0.66—0.70
Gula, at narrowest part, wide - - - - -	0.25
Pronotum, long 0.40—0.42; wide - - - - -	0.66
Tibia iii, long - - - - -	0.89—0.96

Localities.—North Queensland: Townsville (type locality), Magnetic Island, Meringa, Flinders Island, Inverleigh Station; Northern Territory: Roper River, Darwin (alates and others 6.2.13), Daly River (alates and others 28.3.31), Groote Eylandt.

Biology.—Many notes on the biology of this subspecies have been gathered during recent years, most of which are confirmatory of those already published. It is of interest to add that a complete series was collected in Darwin, N.T., in a partly abandoned mound of *Eutermes pastinator* Hill, which contained also the type colony of *Mirotermes septentrionalis* Hill.

Types.—In the author's collection.

RHINOTERMES RETICULATUS Froggatt.

Proc. Linn. Soc. N.S.W., xxi, p. 540, 1896.

(Pl. IV, figs. 11 and 12.)

Dr. Alfred Emerson and the writer are in agreement with Froggatt in regarding the above as being specifically distinct from *R. intermedius* Brauer and its allies, for which subspecific names are proposed in this paper.

Imago.

The imago is distinguished *inter alia* by its darker colour (amber brown), small eyes and ocelli and the wide space separating the former from the latter. The wings, membrane and veins are distinctly darker than in any of the previously mentioned forms.

Measurements.

	mm.
Length with wings - - - - -	12.00—13.25
Length without wings - - - - -	6.50
Head, from base to apex of labrum, long - - - - -	1.70—1.88
Head, from base to clypeofrontal suture, long - - - - -	1.07—1.35
Head, at and including eyes, wide - - - - -	1.55—1.66
Gula, at middle, wide - - - - -	0.55
Fontanelle from clypeofrontal suture - - - - -	0.25—0.29
Pronotum, long 0.74—0.80; wide - - - - -	1.29—1.44
Forewings, long 9.00—10.00; wide - - - - -	2.60—3.20
Tibia iii, long - - - - -	1.66—1.70
Eyes, diameter - - - - -	$0.29 \times 0.33—0.33 \times 0.37$
Eyes, from lower lateral margin of head - - - - -	0.13—0.14
Ocelli, diameter - - - - -	0.07×0.11
Ocelli, from eyes - - - - -	0.07—0.14
Postclypeus, long 0.22—0.27; wide - - - - -	0.77—0.81

Soldier.

Large form.

(Pl. IV, fig. 11.)

The head is nearly straight on the sides, slightly narrowed towards the base of the mandibles and broadly rounded behind; the antennae have 17 or 18 segments, the 2nd segment is longer than the 3rd; the mandibles are short and stout, with a short tooth (very rarely almost obsolete) near the base of the large tooth on the right one; the gula is relatively wide.

Measurements.

	mm
Total length - - - - -	5.50—6.00
Head, with mandibles, long - - - - -	2.36—2.51
Head, at widest part - - - - -	1.44—1.51
Head, base to fontanelle - - - - -	1.22—1.33
Mandible, left, long - - - - -	0.92—0.99
Mandible, right, long - - - - -	0.88—0.92
Gula, at narrowest part, wide - - - - -	0.33—0.40
Pronotum, long 0.53—0.62; wide - - - - -	1.07—1.12
Tibia iii, long - - - - -	1.07—1.33

Soldier.

Small form.

(Pl. IV, fig. 12.)

The head is parallel on the sides and broadly rounded behind; the antennae have 16 segments, the 3rd segment nearly always as long as, but wider than, 2nd, it is rarely very slightly longer or shorter than 2nd; the right mandible has a very small tooth, or an indication of it, as in the large soldier.

Measurements.

	mm.
Total length - - - - -	4.50—5.00
Head, with mandibles, long - - - - -	1.85—1.92
Head, at widest part - - - - -	0.92—0.99
Head, base to fontanelle - - - - -	0.96—0.99
Mandible, left, long - - - - -	0.74—0.77
Mandible, right, long - - - - -	0.74—0.77
Gula, at narrowest part, wide - - - - -	0.29
Pronotum, long 0.48—0.55; wide - - - - -	0.83—0.88
Tibia iii, long - - - - -	1.03—1.11

Localities.—West Australia: Kalgoorlie (type locality); Hovea, Tammin, Mullewa, Merredin, Wongan Hills, Gomalling, Bruce Rock, Northam, National Park, Three Springs and Dowerin.

This species was described from a complete series from the type locality. It is recorded by Froggatt also from Palm Creek, MacDonnell Range, Central Australia (Horne Expedition), and by Mjöberg from Oscar Range, Kimberley Division, North-west Australia. Specimens from the last-mentioned series are referable to *R. intermedius derosus*. I have not seen the specimens collected by the Horne Expedition, but I have examined several series, comprising both forms of soldiers, from Alice Springs and Tennant's Creek, Central Australia, which are not referable to Froggatt's species, nor to any of the subspecies mentioned in the foregoing pages.

Types.—Cotypes are included in the collections of the National Museum, Melbourne, Council for Scientific and Industrial Research, Canberra, Dr. Alfred Emerson and the writer; none of these collections, however, include examples of the large soldier from the type series.

Included in the collections of *Rhinotermes* now under review are many incomplete series which cannot be recognised as belonging to any of the species or subspecies referred to in this paper; in view of the paucity of the available material and the complete absence of imagos brief mention only will be made of the localities whence they have come and the features of the soldiers of the large form which appear to distinguish them from others.

- (a) Central Australia: Alice Springs and Burt Plain;
West Australia: Mullewa.
Nearest to *R. reticulatus*, but with basal tooth on right mandible and 3rd segment of antenna long.
- (b) North Queensland: Cairns.
Nearest to *R. intermedius breinli*, but with larger and less hairy head and basal tooth on right mandible.
- (c) North-western Victoria: Linga, Ouyen, Hattah, Merbein; New South Wales: Bourke, Louth, Eustan.
Most probably *R. intermedius intermedius*.

SOLDIER (large form).

Species	Head			Mandibles			Pronotum.	
	Long	Wide	Right with basal tooth	Mandibles		tufa wide	Long	Wide
				Left	Long			
<i>R. i. intermedius</i> -	2.77-2.96	1.73-1.85	abs.	1.07-1.22		0.37-0.40	0.59-0.62	1.25-1.33
<i>R. i. seclusus</i> -	2.96-3.33	1.85-2.22	pres.	1.11-1.29		0.38-0.46	0.62-0.74	1.14-1.40
<i>R. i. actuosus</i> -	2.80-3.25	1.80-2.10	pres.	1.11-1.22		0.25	0.60-0.74	1.30-1.48
<i>R. i. decorus</i> -	2.33-2.66	1.85-2.20	pres.	1.11-1.29		0.29-0.37	0.74-0.81	1.18-1.42
<i>R. i. breviti</i> -	2.44	1.50-1.55	abs.	1.03-1.11		0.22	0.62-0.66	1.14-1.22
<i>R. reticulatus</i> -	2.36-2.51	1.44-1.51	abs.	0.92-0.99		0.33-0.40	0.53-0.62	1.07-1.12

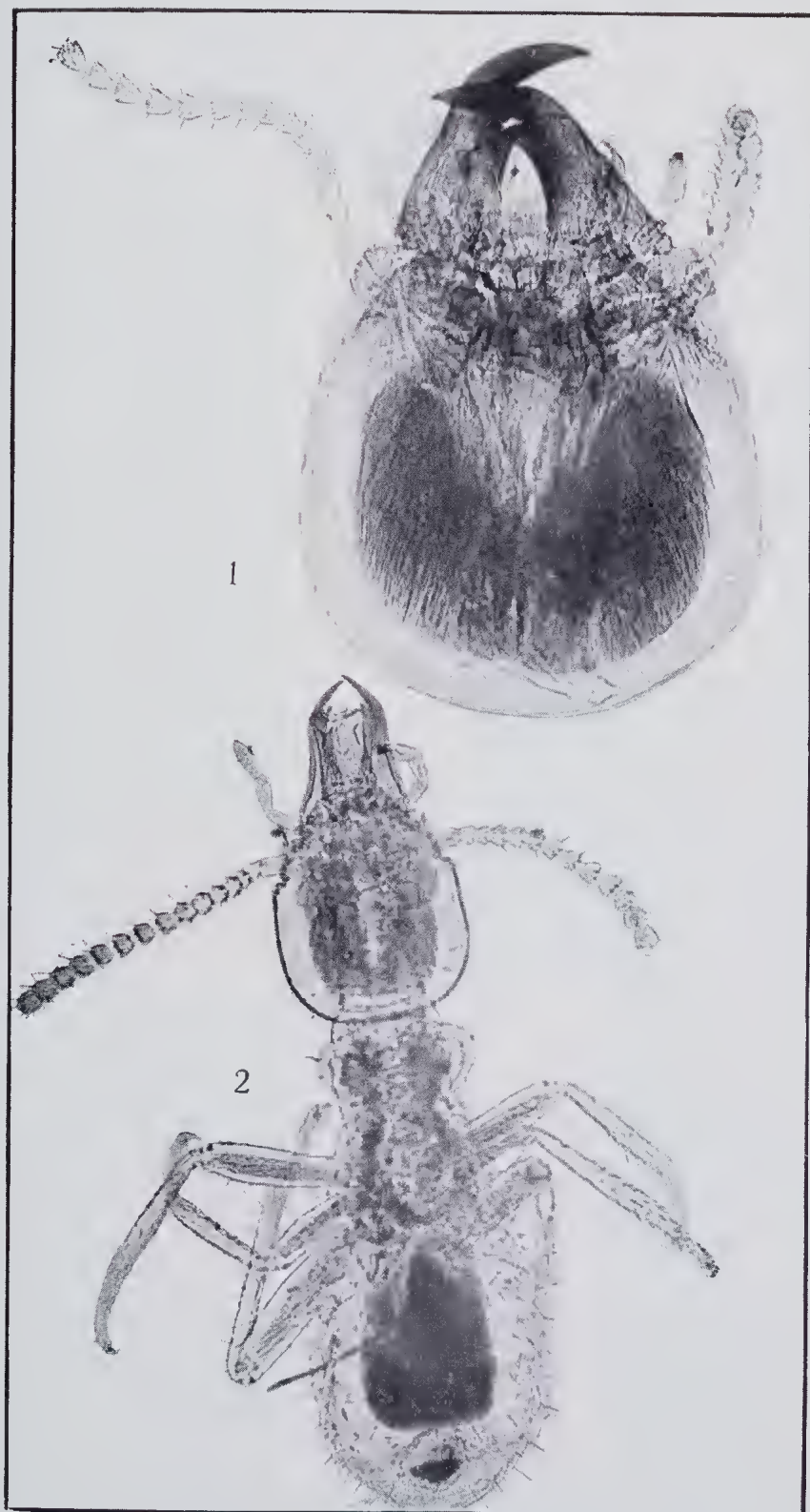
SOLDIER (small form)

Species	Head			Mandibles			Pronotum	
	Long	Wide	Basal tooth	Mandibles		Gula wide	Long	Wide
				Long	Basal tooth			
<i>R. i. intermedius</i> -	1.50-1.80	0.88-0.96	abs.	0.70-0.74		0.27-0.29	0.40-0.44	0.70-0.77
<i>R. i. seclusus</i> -	1.73-1.92	0.93-0.99	abs.	0.75-0.85		0.31-0.33	0.48-0.53	0.72-0.81
<i>R. i. actuosus</i> -	1.70-1.85	0.92-1.03	abs.	0.74-0.77		0.22-0.25	0.44-0.51	0.79-0.83
<i>R. i. decorus</i> -	1.99	1.03	pres.	0.85		0.30	0.55	0.87
<i>R. i. breviti</i> -	1.62	0.81-0.85	abs.	0.66-0.70		0.25	0.40-0.42	0.66
<i>R. reticulatus</i> -	1.85-1.92	0.92-0.99	abs.	0.74-0.77		0.29	0.48-0.55	0.83-0.88

COMPARATIVE MEASUREMENTS OF SPECIES AND SUBSPECIES OF RHINOTERMES.

IMAGO

SPECIES	Total length	Head wide	Eyes diam.	Pronotum		Wings long
				Long	Wide	
<i>R. intermedius intermedius</i> -	17.0-18.0	1.75	0.43 × 0.48 0.44 × 0.55	0.82-0.92	1.53-1.66	13.5
<i>R. i. seclusus</i> -	14.5-15.25	1.80-1.88	0.44 × 0.55 0.44 × 0.48	0.85-0.99	1.59-1.70	10.5
<i>R. i. actuosus</i> -	13.5-14.0	1.62-1.66	0.37 × 0.44 0.37 × 0.48	0.80-0.85	1.36-1.44	10.0-10.25
<i>R. i. derosus</i> -	12.0-12.25	1.49	0.35 × 0.40	0.72	1.25	8.5
* <i>R. i. brevis</i> -	11.5-12.0	1.36-1.40	0.40 × 0.44	0.75	1.18-1.23	9.0
<i>R. reticulatus</i> -	12.0-13.25	1.55-1.66	0.29 × 0.33 0.33 × 0.37	0.74-0.80	1.29-1.44	9.0-10.0



Rhinotermes intermedius intermedius.